AMENDMENTS TO THE CLAIMS

Claim 1-22 (canceled)

Claim 23 (currently amended): A method for determining image quality of an optical imaging system, said method comprising the following steps:

recording an image stack which includes a plurality of individual images of a sample from different adjusting or reference planes near a focus plane;

improving image qualities of the individual images of the image stack by means of image processing; and

evaluating the image stack with the aim of determining characteristic numbers that are characteristic of wavefront deformation caused by the imaging system;

wherein the characteristic numbers are outputted and associated with the imaging system as equivalent for the image quality.

Claim 24 (currently amended): The method according to ~~claim 23,~~ Claim 23;

wherein the characteristic numbers are determined in a first step initially by analytic evaluation and, in a subsequent second step, by further iterative processing of the results from the first step until a given termination criterion is reached.

Claim 25 (currently amended): The method according to ~~claim 23,~~ Claim 23;

wherein ~~the~~ a determination of Zernike polynomials up to a given order is carried out with the analytic evaluation of the image information.

Claim 26 (currently amended): The method according to ~~claim 24,~~ Claim 24;

wherein ~~the~~ a determination of Zernike coefficients is carried out with the iterative evaluation of the image information based on methods in which every wave surface from the image stack of the sample is considered as a unit, or a pixel-by-pixel evaluation is carried out~~[[,]]~~; and

wherein the determined Zernike coefficients correspond to the outputted characteristic numbers.

Claim 27 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein the change of reference plane always takes place in the object space, i.e., by changing the distance of the sample relative to the object plane.

Claim 28 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein the change of reference plane is carried out in predetermined increments.

Claim 29 (currently amended): The method according to ~~claim 24,~~ Claim 24; wherein ~~the~~ a number of variables in the iterative step of the evaluation is increased, preferably doubled, in relation to the preceding, analytic step.

Claims 30 & 31 (canceled)

Claim 32 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein the influence of a pupil of the imaging system is taken into account in the evaluation of the image information, preferably by means of a pupil image that is obtained using a Bertrand system.

Claim 33 (currently amended): The method according to ~~claim 23,~~ Claim 23;

wherein a pupil function is predetermined with respect to apodization.

Claim 34 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein a plurality of detection devices are arranged at different distances to the focus plane and the images are accordingly recorded from the different reference planes at the same time or also successively in time with a corresponding control.

Claim 35 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein a plurality of samples arranged adjacent to one another or a sample with a plurality of objects arranged adjacent to one another is positioned in the sample holder and information concerning the image qualities of the individual images are accordingly determined simultaneously in relation to the corresponding positions in the visual field of the imaging system, and/or simultaneous measurements are carried out with a plurality of different wavelengths in order to detect dispersive or wavelength-dependent effects.

Claim 36 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein samples with binary objects, i.e., pure amplitude objects, are provided.

Claim 37 (currently amended): The method according to ~~claim 36,~~ Claim 36; wherein each binary object is in the form of a round or square pinhole.

Claim 38 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein the image quality is determined in an automatic process beginning with the positioning of a sample until the output of the characteristic numbers.

Claim 39 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein an exposure device is provided which ensures an optimal illumination of the sample depending on the change of the reference plane, and the signal-to-noise ratio is accordingly optimized in the images.

Claim 40 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein a laser beam having a beam waist in the object plane is provided for illuminating the sample in order to achieve a low sigma value and a Gaussian intensity distribution in the pupil.

Claim 41 (withdrawn): A method for determining influences of different samples on an amplitude distribution and phase front distribution of an illumination light, said method comprising the following steps:

determining a wavefront deformation characterizing an optical imaging system based on a sample with known, defined optical characteristics;

exchanging the known sample for a sample which is to be examined and whose optical characteristics are still unknown;

determining the wavefront deformation again based on the sample to be examined;

determining the influence of the sample to be examined based on the image quality under the influence of the defined sample and the image quality without the influence of the sample to be examined; and

determining the characteristics of the sample to be examined.

Claim 42 (withdrawn – currently amended): The method according to ~~claim 41,~~ Claim 41;

wherein the image information obtained with the initially still unknown sample is subjected to post-processing in which the characteristics of the imaging system are separated from the characteristics of the sample that was used to characterize the imaging system, and the specific device characteristics are accordingly corrected at the same time when imaging the unknown sample.

Claim 43 (withdrawn – currently amended): The method according to ~~claim 42,~~ Claim 42;

wherein the influence of specific sample characteristics, particularly the size of an observed object, is also corrected from the image information during the post-processing of the image information at the same time.

Claim 44 (withdrawn – currently amended): The method according to ~~claim 43,~~ Claim 43;

wherein the influence of a stepper in microlithography is factored into the characteristics of the sample image.

Claim 45 (withdrawn – currently amended): The method according to ~~claim 41,~~ Claim 41;

wherein lithography masks, including masks with a phase-shifting effect, are provided as samples.

Claim 46-50 (canceled)

Claim 51 (currently amended): The method according to ~~claim 23,~~ Claim 23;

wherein the characteristic numbers are outputted as Zernike coefficients.

Claim 52 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein improving the image quality of the individual images of the image stack is related to improving the signal to noise ratio.

Claim 53 (currently amended): The method according to ~~claim 23,~~ Claim 23; wherein an initially still unknown sample is recorded by the optical imaging system and the sample characteristics are separated from the characteristics of the imaging system.

Claim 54 (currently amended): The method according to ~~claim 53,~~ Claim 23; wherein the influence of a stepper in microlithography is factored into the characteristics of the initially still unknown sample image.

Claim 55 (currently amended): The method according to ~~claim~~ Claim 41, further comprising:

determining the influence of the sample to be examined on the phase front distribution of the illumination light.

Claim 56 (withdrawn): A method for separating sample characteristics from characteristics of an imaging system comprising the following steps:

obtaining a measured image stack of the imaging system;

calculating a simulated image stack; and

separating images of the measured image stack from corresponding images of the simulated image stack to obtain images of the measured image stack that are freed from the characteristics of the imaging system.

Claim 57 (withdrawn – currently amended): The method according to ~~claim 56,~~ Claim 56;

wherein the images are separated by deconvolution.

Claim 58 (withdrawn – currently amended): The method according to ~~claim 56,~~ Claim 56;

wherein the images are characterized by the image quality that is determined in the form of characteristic numbers.

Claim 59 (withdrawn – currently amended): The method according to ~~claim 58,~~ Claim 58;

wherein the characteristic numbers of the image quality for the sample are determined from the measured image stack.

Claim 60 (withdrawn – currently amended): The method according to ~~claim 56,~~ Claim 56;

wherein sample characteristics are outputted concerning spatial amplitude distribution, spatial intensity distribution, or spatial phase distribution.

Claim 61 (new): The method according to Claim 37;

wherein the pinhole has a diameter d_{PH} = 300 nm, illumination light with the wavelength of 248 nm is used, the pixel size at the sample is 45 nm, the numerical aperture of the imaging system is 0.2, the illumination aperture corresponds to the numerical aperture of the imaging system, the illumination of the sample is carried out with partially coherent light at σ = 0.8, the diameter of the Airy disk in the image is 1.512 μm, the depth of focus is 6.2 μm, the defocusing from image to image is carried out

within the depth of focus range at ±1 RE (RE = Rayleigh unit), ±3 RE, and ±0.8 RE or ±6.2 μm, ±18.6 μm, and ±5 μm, and an odd-number quantity of images is predetermined, preferably a quantity of 7, 11, or 21 images.

Claim 62 (new): The method according to Claim 37;

wherein a deconvolution of the image information is provided depending upon the size of the pinhole in the sample in order to exclude the influence of the pinhole size on the results.

Claim 63 (new): A method for determining image quality of an optical imaging system, said method comprising the following steps:

recording an image stack which includes a plurality of individual images of a sample from different adjusting or reference planes near a focus plane;

improving image qualities of the individual images of the image stack by means of image processing; and

evaluating the image stack with the aim of determining characteristic numbers that are characteristic of wavefront deformation caused by the imaging system;

wherein samples with binary objects, i.e., pure amplitude objects, are provided.

Claim 64 (new): A method for determining image quality of an optical imaging system, said method comprising the following steps:

recording an image stack which includes a plurality of individual images of a sample from different adjusting or reference planes near a focus plane;

improving image qualities of the individual images of the image stack by means of image processing; and

evaluating the image stack with the aim of determining characteristic numbers that are characteristic of wavefront deformation caused by the imaging system;

wherein an initially still unknown sample is recorded by the optical imaging system and the sample characteristics are separated from the characteristics of the imaging system.